ADDENDUM NO. 1
TO SPEC. NO. 02-202
HEAVY DUTY DUPLEX, NON-CLOG SUBMERSIBLE WASTEWATER PUMPING SYSTEM

Addendum No. 1 to Spec. 02-202 for a Heavy Duty Duplex Non-Clog Submersible Wastewater Pumping System, bids to be opened Wednesday, September 25, 2002 at 12:00 noon.

Please replace the enclosed specifications for Submersible Wastewater Non-Clog Duplex Pump System with the specifications that you received in the original bid packet.

All other terms and conditions to remain unchanged.

Dated this 10th day of September, 2002.

Purchasing Department

Vince M. Mejer, CPPO, C.P.M.
Purchasing Agent

Specifications
For
Submersible Wastewater Non-Clog Duplex Pump System
NW 3RD & West Charleston Liftstation

1. General

1.1 Supplier shall furnish a heavy duty, duplex, non-clog, submersible wastewater pumping system including pumps, valves, hardware, controls, and electrical distribution panel as per the requirements and specifications described herein.

1.2 Acceptable manufacturer shall be ITT Flygt, Model NP3127.488.

2. Pump Operating Requirements and Conditions

2.1 Each submersible pump shall be sized by the manufacturer for a flow rate of 281 GPM @ 63.4 TDH.

2.1.1 An additional point on the same curve shall be 537GPM at 48.6 TDH.

2.2 Each pump shall be equipped with an 10 HP submersible electric motor as per the specifications described under that section for operation on 230 volts, 3 phase, 60 hertz, 4 wire service.

2.3 Each pump/motor shall be equipped with 40 feet of submersible cable (SUBCAB) suitable for submersible pump applications.

2.3.1 The power cable shall be sized according to NEC and ICEA standards and have P-MSHA Approval.

2.4 Each pump shall be supplied with a mating cast iron 4 inch discharge connection.

2.5 Each pump shall be fitted with 25 feet of ¼" Stainless Steel lifting chain.

2.5.1 The working load of the lifting system shall be 50% greater than the pump unit weight.

3. Pump Design and Construction

3.1 Each pump shall be automatically and firmly connected to the discharge connection, guided by no less than two guide bars extending from the top of the station to the discharge connection.

3.1.1 Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact.

3.1.2 Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable.

3.2 No portion of the pump shall bear directly on the sump floor.

3.3 Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities.

3.4 All exposed nuts or bolts shall be AISI type 304 stainless steel construction.

3.5 All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

3.6 Sealing design shall incorporate metal-to-metal contact between machined surfaces.

3.7 Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton rubber O-rings.

3.8 Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

3.9 Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal.

3.10 No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

4. Cooling System

4.1 Motors shall be sufficiently cooled by the surrounding environment or pumped media and shall not require a water jacket.

5. Cable Entry Seal

5.1 The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal.

5.2 The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable.

5.2.1 The assembly shall provide ease of changing the cable when necessary using the same entry seal.

5.3 The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the interior from foreign material gaining access through the pump top.

5.3.1 Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

6. Motor

6.1 The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber.

6.2 The stator windings shall be insulated with moisture resistant Class H insulation rated for 180 degrees C (356 degrees F).

6.3 The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%.

6.4 The stator shall be heat-shrink fitted into the cast iron stator housing.

6.5 The use of multiple step dip and bake-type stator insulation process is not acceptable.

6.6 The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable.

6.7 The motor shall be designed for continuous duty handling pumped media of 40 degrees C (104 degrees F) and capable of up to 15 evenly spaced starts per hour.

6.8 The rotor bars and short circuit rings shall be made of cast aluminum.

6.9 Thermal switches set to open at 125 degrees C (260 degrees F) shall be embedded in the stator lead coils to monitor the temperature of each phase winding.

6.9.1 These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel.

6.10 The junction chamber containing the terminal board, shall be hermetically sealed from the motor by an elastomer compression seal.

6.11 Connection between the cable conductors and stator leads shall be made with threaded compression type binding posts permanently affixed to a terminal board.

6.12 The motor and the pump shall be produced by the same manufacturer.

6.13 The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15.

6.14 The motor shall have a voltage tolerance of plus or minus 10%.

6.15 The motor shall be designed for operation up to 40 C (104 F) ambient and with a temperature rise not to exceed 80 C.

6.16 A performance chart shall be provided showing curves for torque, current, power factor, input/output kW and efficiency.

6.16.1 Performance chart shall also include data on starting and no-load characteristics.

7. Power Cable

7.1 The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices.

7.2 The outer jacket of the cable shall be oil resistant chloroprene rubber.

7.3 The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.

8. Bearings

8.1 Motor bearings shall be permanently grease lubricated.

8.2 The upper bearing shall be a single deep groove ball bearing.

8.3 The lower bearing shall be a two row angular contact bearing to compensate for axial thrust and radial forces.

8.3.1 Single row lower bearings are not acceptable.

9. Mechanical Seal

9.1 Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies.

9.2 The seals shall operate in an lubricant reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate.

9.3 The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, corrosion resistant tungsten-carbide ring.

9.4 The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, corrosion resistant tungsten-carbide seal ring.

9.5 Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor depend on direction of rotation for sealing.

9.6 Each pump shall be provided with an lubricant chamber for the shaft sealing system.

9.7 The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity.

9.8 The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside.

9.9 The seal system shall not rely upon the pumped media for lubrication.

9.9.1 The motor shall be able to operate dry without damage while pumping under load.

9.10 Seal lubricant shall be FDA Approved, nontoxic.

10. Pump Shaft

10.1 Pump and motor shaft shall be the same unit.

10.2 The pump shaft is an extension of the motor shaft.

10.3 Shaft shall be AISI type 431 stainless steel.

10.4 Pump couplings shall not be acceptable.

11. N Pump Impeller

11.1 Pump impellers shall be of gray cast iron, Class 35B, dynamically balanced, semi-open, multi-vane, back-swept, non-clog design.

11.2 The impeller vane leading edges shall be mechanically self-cleaned upon each rotation as they pass across a spiral groove located on the volute suction which shall keep them clear of debris, maintaining an unobstructed leading edge.

11.3 The impeller(s) vanes shall have screw-shaped leading edges that are hardened to Rc 45 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in waste water.

11.4 The impeller inlet shall be screw shaped to provide an inducing effect for the handling of sludge and rag-laden wastewater.

11.5 Impellers shall be locked to the shaft and shall be coated with alkyd resin primer.

12. N Pump Volute Bottom/Insert Ring

12.1 The pump volute shall be of A48 Class 35B gray cast iron and shall have (an) integral spiral shaped cast groove(s) at the suction of the volute.

12.2 The internal volute bottom or insert ring shall provide effective sealing between the pump volute and the multi-vane, semi-open impeller.

12.3 The sharp spiral groove(s) shall provide the shearing edge(s) across which each impeller vane leading edge shall cross during its rotation in order to remain unobstructed.

12.4 The clearance between the internal volute bottom and the impeller leading edges shall be adjustable.

13. Mix-Flush Valve Assembly

13.1 Each pump shall be equipped with an automatically operating valve that will provide a mixing action within the sump at the start-up of the pumping cycle.

13.2 This valve shall be mounted directly on the pump volute and shall direct a portion of the pumpage into the sump to flush and re-suspend solids and grease by the turbulent action of its-discharge.

13.3 The valve shall be mounted on the pump volute so that it can be removed from the sump along with the pump during normal and routine maintenance checks and shall be positioned on the volute to provide for non-clogging operation.

13.4 The valve shall be equipped with an adjustable, wear-resistant discharge nozzle which shall be used to direct flow from the valve to optimize mixing action within the sump.

13.5 The valve shall not require any external power source or control to operate, neither electric nor pneumatic.

13.6 The valve shall be suitable for use in Class I, Division 1 hazardous locations.

14. Control and Power Distribution

14.1 General

14.1.1 Control system shall be supplied by the pump manufacture containing all the mechanical and electrical equipment necessary to provide for the operation of the submersible pump or pumps as depicted on the drawings and described in the specifications.

14.2 Enclosure

14.2.1 The control panel enclosure shall be rated Nema 4X stainless steel sized to house the specified MT2PC Controller and the existing telemetry RTU .

14.2.2 The enclosure door shall be gasketed with a rubber composition material around the perimeter and shall be installed with a retainer to assure a positive weatherproof seal.

14.2.2.1 The door shall open a minimum of 180 degrees.

14.2.2.2 A padlock hasp shall be provided.

14.2.3 A polished inner door shall be mounted on a continuous aluminum aircraft type hinge and shall contain cutouts for the protrusion of the circuit breakers and provide protection of the personnel from internal live voltages.

14.2.3.1 All control switches, pilot indicators, elapsed time meters and other operational devices shall be mounted on the external surface of the dead front.

14.2.3.2 The dead front door shall open a minimum of 150 degrees to allow for access to the equipment for maintenance.

14.2.3.3 A ¾" break shall be formed around the perimeter of the dead front to provide rigidity.

14.2.4 A back plate shall be manufactured from 12 gauge sheet steel and be finished with a primer coat and two {2} coats of baked-on white enamel.

14.2.5 All hardware shall be mounted using stainless steel machine thread screws. (Sheet metal screws shall not be acceptable)

14.2.6 All installed devices will be permanently identified with engraved legends.

14.3 Power Distribution

14.3.1 The panel power distribution shall include all necessary components and shall be wired with stranded copper conductors rated at 90 degrees "C".

14.3.2 Conductor terminations shall be as recommended by the device manufacture.

14.3.3 The power system shall contain incoming power terminals, motor circuit breakers and control circuit breaker.

14.3.4 All circuit breakers shall be heavy duty thermal magnetic or motor circuit
protector similar and equal to Square "D" type "FAL".

14.3.4.1 Each breaker shall be sized to adequately meet the operating conditions of the load and have a minimum interrupting capacity of 10,000 amps at 230v and 18,000 at 460v.

14.3.4.2 Breakers shall be indicating type, providing an "on-off-tripped" positions of the handle.

14.3.4.3 They shall be quick make-quick break on manual and automatic operation and have inverse time characteristics.

14.3.4.4 Breakers shall be designed so that tripping of one pole automatically trips all poles.

14.3.5 Motor starters shall be open frame, across the line, NEMA rated with individual overload protection in each phase.

14.3.5.1 Motor starter contacts and coil shall be replaceable from the front of the starter without removal of the starter from its mounted position.

14.3.5.2 Overload heaters shall be block type, utilizing melting alloy spindles, sized for the full load amperage of the load.

14.3.6 A solid state lightning-transit protector shall be provided with a response time of less than 5 nano-seconds with a withstanding surge capacity of 6500 amperes.

14.3.6.1 Units shall be instant recovery, long life and have no holdover currents.

14.3.7 The following components shall be supplied as standard equipment.

14.3.7.1 12 pin plug in phase/voltage monitor shall be supplied with two double pole double throw contacts.

14.3.7.2 Nema 4 rated Hand Off Auto or spring loaded Hand Auto switches for bypass control depending on the control selections.

14.3.7.3 Run/ failure lights as required.

14.3.7.4 Elapse time meters.

14.3.7.5 Alternation with lead /lag selector/ test switch/indicators.

14.3.7.6 50 watt condensation heater and thermostat.

14.3.7.7 Control wiring to be 18 AWG copper-tinned rated at 105 degrees C.

14.3.7.8 Each wire shall be numbered corresponding to the wiring diagram.

14.3.7.9 Single phase capacitor banks will be provided when required.

14.4 Multitrode MT2PC Probe Controller System

14.4.1 A bar graph level readout controller shall be provided to indicate level in the wet well.

14.4.2 The controller shall control the pumps and monitor up to three alarm points.

14.4.3 The unit shall be able to discriminate between four different fault conditions.

14.4.4 The controller shall provide multiple LED indicators to indicate pump operation, pump faults, alternation sequence and alarm conditions.

14.4.5 A key board shall be mounted onto the dead front door that will program the following.

14.4.5.1 Pump activation and deactivation points.

14.4.5.2 Alternation sequence.

14.4.5.3 Time delays for pump on sequence.

14.4.5.4 Monitor pump seal and temperature failures.

14.4.5.5 Monitoring of critical and non critical faults.

14.4.5.6 Reset all alarm fault indications.

14.4.6 Multitrode MT2PC probe controller shall be intrinsically safe.

14.4.6.1 Intrinsically safe wiring shall be separated from non-intrinsically safe wiring.

14.5 External Sensor/Probe

14.5.1 Probe casings shall be uPVC premium quality extruded tube.

14.5.2 The sensor shall be constructed of Avesta 254 SMO high grade stainless steel alloy.

14.5.3 The sensor/probe shall be 2.5 meters in length.

14.5.4 The cable shall be PVC/PVC multi-core.

14.6 Miscellaneous

14.6.1 A final as built drawings encapsulated in mylar shall be attached to the inside of the front door.

14.6.1.1 A list of all legends shall be included.

14.6.2 All control panels shall be listed by a nationally recognized testing laboratory [NRTL] and apply the certification necessary to indicate the NRTL approval.

14.6.3 All intrinsically safe controls shall be certified under UL Hazardous location with UL913 devices acceptable for use in class I,II,III, division I locations in addition to the NRTL recognition.

14.6.4 All equipment shall be guaranteed for a period of three (3) years from the date of shipment.

14.6.5 The warranty is effective against all defects in workmanship and / or defective components.

14.6.5.1 The warranty is limited to the replacement or repair of the defective equipment.

15. Protection

15.1 All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding.

15.2 The thermal switches shall open at 125 degree C (260 degree F), stop the motor and activate an alarm.

15.3 Each pump shall be equipped with a (FLS) Float Leakage Sensor to detect water in the stator chamber.

15.4 The Float Leakage Sensor (FLS) when activated, shall stop the motor and send an alarm both local and/or remote.

15.5 The thermal switches and FLS shall be connected to a Mini CAS (Control and Status) monitoring unit mounted in the control panel.

16. Testing

16.1 Testing of each pump shall be performed and include the following inspections:

16.1.1 Impeller, motor rating and electrical connections shall be checked for compliance with this specification.

16.1.2 Prior to submergence, each pump shall be run dry to establish correct rotation.

16.1.3 Each pump shall be run submerged in water.

16.1.4 Motor and cable insulation shall be tested for moisture content or insulation defects.

16.2 A written quality assurance record confirming the above testing/inspections shall be supplied with each pump at the time of shipment.

17. Start-Up Service

17.1 The equipment manufacturer shall furnish the services of a qualified factory trained field service engineer for 8-hour working day(s) at the site to inspect the installation and instruct the owner's personnel on the operation and maintenance of the pumping units.

17.2 After the pumps have been completely installed and wired, the following startup services shall be performed:

17.2.1 Megger stator and power cables.

17.2.2 Check seal lubrication.

17.2.3 Check for proper rotation.

17.2.4 Check power supply voltage.
17.2.5 Measure motor operating load and no load current.
17.2.6 Check level control operation and sequence.

17.3 During this initial inspection, the manufacturer's service representative shall review recommended operation and maintenance procedures with the owner's personnel.

18. Warranty

18.1 Five (5) year 10,000 hour manufacturers warranty. (See Attached)

18.2 The warranty shall be in printed form and previously published as the manufacturer's standard warranty for all similar units manufactured.

19. Operation and Maintenance Information

19.1 Three (3) sets of O&M manuals specific to the pump model supplied shall accompany delivery of the equipment.

19.2 O&M manual information shall consist of general operating instruction, recommended spare parts, recommended maintenance, trouble shooting guides, and exploded part assembly views specific to the pump model supplied.

19.3 Supplier shall supply a manufacturers pump performance curve specific to the pump model supplied.

20. Delivery Information and Contact

20.1 Contact **Mr. Steve Crisler**, telephone number 402-441-7966 or **Mr. Steve Schmalken**, telephone number 402-441-7029 with any technical questions regarding this request.

20.2 Shipping address is as follows: City of Lincoln, Northeast Wastewater Treatment Facility, 7000 North 70th Street, Lincoln, Ne. 68507